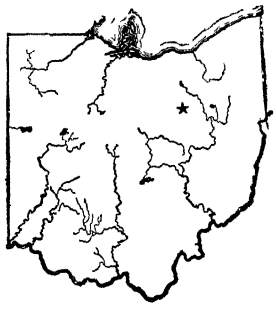
THIRTY-SEVENTH ANNUAL REPORT

FOR 1917-18

# OHIO
# Agricultural Experiment Station

WOOSTER, OHIO, U. S. A., JUNE, 1918

*BULLETIN 325*



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# Thirty-Seventh Annual Report

OF THE

# *Ohio Agricultural Experiment Station*

*For the Year ended June 30, 1918*

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*Published by order of the State Legislature*

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WOOSTER, OHIO
EXPERIMENT STATION PRESS
1918

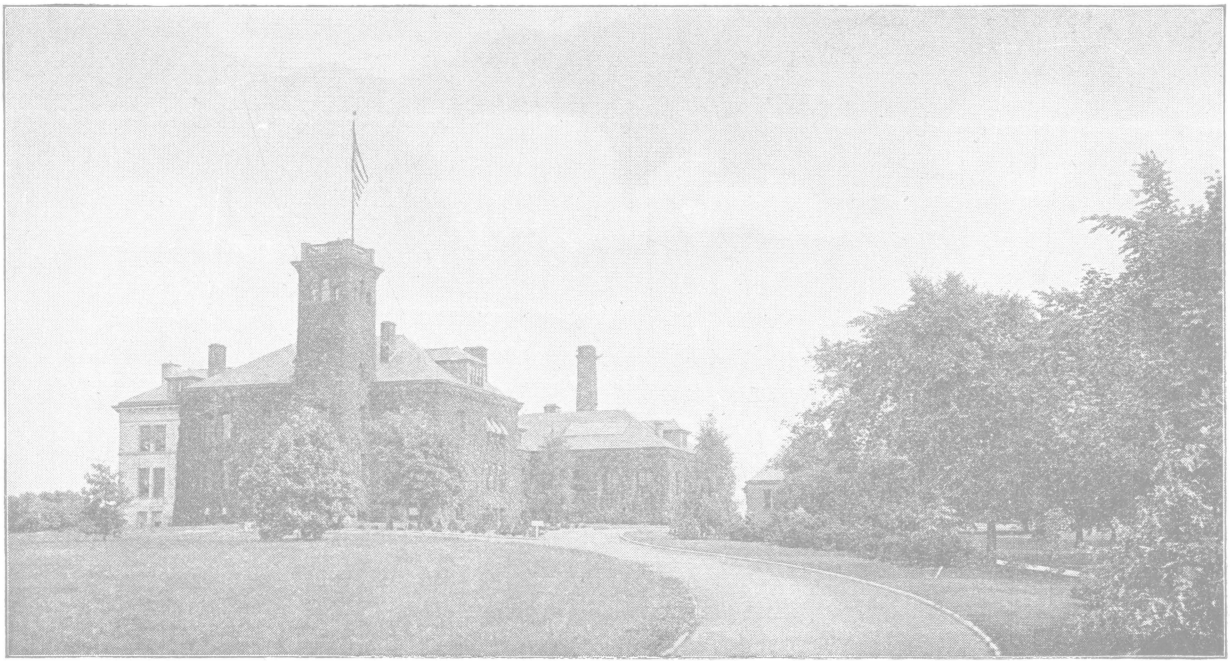
HON. JAMES M. COX,

*Governor of Ohio*:

SIR: I have the honor to transmit herewith the Thirty-Seventh Annual Report of the Ohio Agricultural Experiment Station, for the year ended June 30, 1918.

G. E. JOBE,

*President of the Board of Control*



Administration Building

# OHIO AGRICULTURAL EXPERIMENT STATION

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J. B. PARK, Ph. D. ..... Associate (Ohio State University, Columbus)
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C. A. PATTON ..... Assistant
C. A. GEARHART, B. S. ..... Assistant
E. C. MORR ..... Office Assistant
C. H. LEBOLD ..... Assistant Foreman

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E. C. SCHWAN ..... Shepherd (Carpenter)

### BOTANY

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TRUE HOUSER, B. S., *Assistant* ..... Tobacco Breeding (Germantown)
D. C. BABCOCK, A. B., *Assistant* ..... Forest and Shade Tree Diseases
WAYNE VAN PELT, B. S., *Assistant* ..... Field Crop and Vegetable Diseases

### CHEMISTRY

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J. A. STENIUS, B. S. ..... Assistant
C. J. SCHOLLENBERGER ..... Assistant
T. E. RICHMOND, M. S. ..... Assistant
MABEL K. CORBOULD, *Assistant* ..... Milling and Baking Technology

### CLIMATOLOGY

W. H. ALEXANDER[2] ..... Climatologist (Columbus)
C. A. PATTON ..... Observer

### DAIRYING

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A. E. PERKINS, M. S., *Assistant* ..... Dairy Chemistry
R. I. GRADY, B. S., *Assistant* ..... Dairy Chemistry
W. E. VORDERMARK ..... Office Assistant

### ENTOMOLOGY

H. A. GOSSARD, M. S., *Chief* ..... Insects in Relation to Vegetable Diseases
HERBERT OSBORN, M. S.[3] ..... Associate
J. S. HOUSER, M. S. A., *Associate* ..... Forest, Shade Tree and Scale Insects
R. D. WHITMARSH, M. S., *Assistant* ..... Greenhouse and Household Insects
J. R. STEAR, B. S.[1] ..... Assistant
D. C. MOTE, M. S., *Assistant* ..... Animal Parasites

## FORESTRY

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J. J. CRUMLEY, Ph. D. ..... Assistant
A. E. TAYLOR, B. S. ..... Assistant
J. W. CALLAND, B. S. ..... Assistant
RUTH E. MCCOY ..... Office Assistant
SCOTT HARRY ..... Foreman of Nursery

## HORTICULTURE

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PAUL THAYER, M. S. ..... Assistant
C. W. ELLENWOOD ..... Field Assistant
ORA FLACK ..... Foreman of Orchards
W. E. BONTRAGER ..... Foreman of Grounds
C. G. LAPER ..... Foreman of Greenhouses
S. N. GREEN, *Garden Assistant* ..... Vegetable Improvement

## NUTRITION

E. B. FORBES, Ph. D.[1] ..... Chief
J. O. HALVERSON, Ph. D. ..... Assistant
J. A. SCHULZ, B. S. ..... Assistant

## SOILS

THE DIRECTOR ..... Chief
C. G. WILLIAMS ..... Associate
J. W. AMES, M. S, *Associate* ..... Soil Chemistry
FIRMAN E. BEAR, Ph. D.[2] ..... Associate (Columbus)

## DIVISION OF SOIL TECHNOLOGY

E. R. ALLEN, Ph. D.[4] ..... Associate in Charge
B. S. DAVISSON, A. M., *Assistant* ..... Soil Biology
G. W. CONREY, A. M., *Assistant*[3] ..... Soil Survey (Columbus)
A. BONAZZI, B. Agr., *Assistant* ..... Soil Biology

## FARM MANAGEMENT

C. W. MONTGOMERY ..... Chief
C. M. TIMMONS ..... Office Assistant

## DISTRICT EXPERIMENT FARMS

**Northeastern Test Farm, Strongsville**
J. PAUL MARKLEY, *Superintendent*

**Southwestern Test Farm, Germantown**
HENRY M. WACHTER, *Superintendent*

**Southeastern Test Farm, Carpenter**
S. C. HARTMAN, *Superintendent*

**Northwestern Test Farm, Findlay**
JOHN A. SUTTON, *Superintendent*

## COUNTY EXPERIMENT FARMS

**Miami County Experiment Farm, Troy**
PERLE A. JONES, *Foreman*

**Paulding County Experiment Farm, Paulding**
HARRY JOHNSON, *Foreman*

**Madison County Experiment Farm, London**
H. W. ROGERS, *Foreman*
R. R. BARKER, B. S., *Superintendent*

**Clermont Co. Experiment Farm, Owensville**
HOWARD ELLIOTT, *Foreman*

**Hamilton Co. Experiment Farm, Mt. Healthy**
M. D. MOORE, *Foreman*
W. J. SMITH, *Superintendent*

**Washington Co. Experiment Farm, Fleming**
C. B. HARVEY, *Foreman*

**Washington Co. Truck Farm, Marietta**
O. N. RILEY, *Foreman*
S. C. HARTMAN, *Superintendent*

**Belmont Co. Experiment Farm, St. Clairsville**
J. J. LENTZ, *Foreman*
C. W. MONTGOMERY, *Superintendent*

**Mahoning County Experiment Farm, Canfield**
CARL M. RUNKLE, *Foreman*

**Trumbull County Experiment Farm, Cortland**
D. E. WOODFORD, *Foreman*
M. O. BUGBY, B. S., *Superintendent*

## STATE FORESTS

**Waterloo State Forest, New Marshfield**
JOHN WITHERS, *In Charge*

**Dean State Forest, Steece**
G. C. MARTIN, *In Charge*

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[1] On leave of absence for military service.
[2] In cooperation with the U. S. Department of Agriculture.
[3] In cooperation with College of Agriculture, Ohio State University.
[4] On leave of absence.

# ANNOUNCEMENT

The Ohio Agricultural Experiment Station is organized under an act of the General Assembly of Ohio, passed April 17, 1882, and supplemented by an act of Congress, approved March 2, 1887.

## WHAT THE STATION CAN DO

The Station offers its advice and assistance to the farmers of Ohio along the following lines:

The maintenance of soil fertility, including the rotation of crops and the selection and use of manures and fertilizing materials.

The selection of varieties of grains, grasses and forage crops and methods of culture.

The selection of varieties of fruits and vegetables and the management of orchards.

The examination of seeds that are suspected of being unsound or adulterated; the identification of grasses, weeds and other plants; the prevention of fungous diseases of plants.

The identification of insects and the control of such as are injurious.

The feeding of animals, including calculation of rations and use of various feeding stuffs.

The planting and care of forest trees and the management of farm woodlots.

Visitors to the Station or its various test farms are welcome at all times during business hours. Persons or parties who contemplate such visits and who desire special attention are requested to write in advance, giving date of proposed visit and probable number of party.

Any citizen of Ohio has the right to apply to the Station for such assistance as it can give, and all such requests will receive prompt attention.

The Bulletins of this Station are sent free to all residents of the State who request them.

## WHAT THE STATION CANNOT DO

For advice and assistance along the following lines, application should be made to the OHIO STATE BOARD OF AGRICULTURE, Columbus, not to the Experiment Station.

The analysis of commercial fertilizers, of lime or limestone for agricultural purposes, and of feeding stuffs.

The treatment of contagious diseases of animals.

The inspection of orchards and nurseries for the control of San Jose scale.

The examination of foods, drugs, and dairy products suspected of being adulterated.

The Station is not prepared to analyze drinking water; requests for such analysis should be addressed to the SECRETARY OF THE STATE BOARD OF HEALTH, Columbus.

Address all communications to
EXPERIMENT STATION,
Wooster, Ohio.

# REPORT OF THE DIRECTOR

HON. G. E. JOBE,

*President of the Board of Control.*

Sir: I have the honor of submitting the thirty-seventh annual report of the Ohio Agricultural Experiment Station, for the year ended June 30, 1918.

## THE FINANCIAL SITUATION

The last appropriations for the support of the Station were made during the spring of 1916, when the inflation in values which is now being experienced had only just begun. The average farm values in Ohio for the principal items of farm produce in the winter of 1915-16 and the winter of 1917-18, as computed by the United States Department of Agriculture, were as below:

| | Average prices 1915-16 | 1917-18 |
|---|---|---|
| Corn, No. 2 per bushel | $ 0.56 | $ 1.36 |
| Wheat, per bushel | 1.04 | 2.04 |
| Oats, per bushel | .36 | .64 |
| Hay, per ton | 12.70 | 19.00 |
| Cattle (other than cows) per head | 33.80 | 43.70 |
| Sheep, per head | 5.40 | 11.60 |
| Hogs, per head | 9.00 | 20.50 |
| Wool, per pound | .27 | .67 |

This advance in prices has of course been reflected in an even greater advance in the cost of living, while the withdrawal of men for the army and the demand for men in the manufacture of munitions and the building of cantonments, ships and airplanes, has raised the rate of wages in general to such a point that it is impossible to continue the Station's work on the scale which was in operation when these appropriations were made and for which they were intended. And this has occurred at a time when the help which the Experiment Station is able to give to the farmers of the State is needed more urgently than ever before in its history.

## INVESTIGATIONS IN PROGRESS

The principal subjects under investigation at the Station have been listed in the thirty-fourth, thirty-fifth and thirty-sixth annual reports. Most of these investigations are still in progress, either actively, or in temporary suspension until the opportunity shall come to take them up again, for it is very seldom possible to say of

a project in agricultural research that it is finished. The following subjects have been added to the list, or have received special attention during the year under review:

### AGRONOMY

The war has interfered with certain lines of work of the department, particularly with the breeding work with corn, oats and soybeans, but the greater part of the investigations reported in earlier annual reports is being carried forward.

The following investigations have not been reported heretofore:

69. Factors related to the lodging of small grains, particularly wheat and oats. (An Adams Fund project.)

70. A comparison of the use of clover for hay with its direct use as a fertilizer in a 3-year rotation of corn, wheat and clover. And when used as a fertilizer, a further comparison of plowing it under at different times, followed by different treatments.

71. Preparing seedbeds for wheat in different ways; plowing at different dates, disking and plowing, and disking only.

**Publications.**—Bulletin 328, "Livestock vs. Grain Farming," C. G. Williams. *Monthly Bulletin*: "Buckwheat Culture" (July, 1917), C. G. Williams; "Acid Phosphate vs. Raw Phosphate Rock" (August, 1917), C. G. Williams; "Shrinkage in Grain,, (February, 1918), F. A. Welton; "Midsummer Forage Crops" (June, 1918), C. G. Williams.

### ANIMAL HUSBANDRY

**Publications.**—Bulletin 316, "Proportions of Supplements to Corn for Fattening Swine," W. L. Robison; Bulletin 320, "Some External Parasites of Poultry," D. C. Mote; Bulletin 322, "Feeding Experiments with Laying Hens," W. J. Buss. *Monthly Bulletin*: "Silage for Fattening Cattle" (July, 1917—Abs. Bul. 193), B. E. Carmichael; "Supplements to Corn for Fattening Swine" (October, 1917—Abs. Bul. 316), W. L. Robison; "Feeding Swine in Dry Lot" (December, 1917—Abs. Bul. 209), W. L. Robison; "Mating Sows Before Their Litters are Weaned" (May, 1918), W. L. Robison; "The More Common Lice of Poultry" (May, 1918), D. C. Mote; "Stomach Worms and Tape-worms of Sheep" (June, 1918), D. C. Mote; "Scaly Leg of Poultry" (June, 1918), D. C. Mote.

### BOTANY

All projects listed in previous reports have been continued with special work on the following subjects:

1. **Weeds.**—Continuation of fuel-oil spraying, in cooperation with D. R. Van Atta, the County Agricultural Agent of Hamilton County.

3. **Orchard diseases.**—Investigations on fire-blight infection in cooperation with Department of Entomology are now suspended because of withdrawal of an assistant.

5. A new disease of tulip poplar in the nursery of the Foresty Department caused by a species of Verticillium is under study. A root-rot of white pine in nursery, possibly associated with an andophytic fungus is being investigated.

7. (a) Special percentage counts in diseases of wheat and oats have been made.

(b) Investigations of diseases prevalent upon clover and alfalfa have been made.

8. (c) Investigations are continued upon diseases of onions.

(d) Organization has been affected for certification of seed potatoes in cooperation with the Ohio Vegetable Growers' Association and the Extension Service of the College of Agriculture, Ohio State University.

(e) Detailed experiments in seed treatment and spraying potatoes are in progress.

11. Cooperation in the Plant Service Survey of the Bureau of Plant Industry now calls for increased labor and semi-monthly reports.

**Publications.**—Bulletin 319, "Ohio Potato Diseases," with colored poster, D. C. Babcock; Bulletin 331, "Tomato Diseases in Ohio," J. G. Humbert. *Monthly Bulletin*: "Diseases of Wheat" (July 1917), A. D. Selby; "Late Blight of Potatoes" (August, 1917), D. C. Babcock; "Diseases of Ornamental Plants" (October, 1917), D. C. Babcock; "Fire-Blight Infection" (November, 1917), H. A. Gossard and R. C. Walton; "Black Knot of Plum and Cherry" (February, 1918), R. C. Walton; "Disease-resistant Varieties of Tomatoes" (February, 1918), S. N. Green and J. G. Humbert; "Apple or Cedar Rust" (March, 1918), R. C. Walton; "Potato Diseases Controlled by Seed Selection" (May, 1918), D. C. Babcock; "Spraying for Tomato Diseases" (June, 1918), J. S. Houser and J. G. Humbert.

## CHEMISTRY

The work of the Department of Chemistry has been continued as outlined in the projects listed in the annual report for 1916-1917 (Bulletin 315).

An additional investigation undertaken is a study of methods for rendering the phosphorus of rock phosphate available when incorporated with sulphur in compact heaps of soil and manure.

A partial report of work in progress has been made in the following publications:

**Publications.**—Bulletin 318, "Relation of Phosphorus and Nitrogen in Soil to the Composition of Wheat," J. W. Ames and G. E. Boltz. *Monthly Bulletin*: "Wheat Flour Substitutes" (July, 1917), Mabel K. Corbould; "Acid Soils and Soil Acidity" (October, 1917), C. J. Schollenberger; "Loss of Organic Matter in Clover Returned to Soil" (December, 1917), G. E. Boltz and C. E. Schollenberger; Soil Science: Vol. V, No. 4, p. 311 (April, 1918), "Sulfofication in Relation to Nitrogen Transformations," J. W. Ames and T. E. Richmond; Vol. IV, No. 1 (July, 1917), "Fermentation of Manure Treated with Sulphur and Sulphates; Changes in Nitrogen and Phosphorus Content," J. W. Ames and T. E. Richmond. Journal American Society of Agronomy: Vol. X, No. 5, p. 210, 1918, "Loss of Organic Matter in Clover Returned to the Soil," G. E. Boltz.

DAIRYING

The investigations enumerated in the thirty-sixth annual report are being continued without change, except as noted below:

1. **Wide, medium and narrow rations for dairy cows.**—Continued without change.

2. **Comparison of alfalfa with red clover for milk production.**—Project published in Bulletin 327. Continued.

3. **The cost of raising dairy heifers.**—Some results of this work were given in Bulletin 289, and later in the Monthly Bulletin for September, 1917. The work is being continued.

4. A study of the composition of milk and fat is being continued.—
   (a) As affected by feeds,
   (b) From different breeds of cows, and
   (c) With reference to the natural quantitative relationship existing between the various constituents of milk.

Some results from sub-topics "b" and "c" were reported in the Monthly Bulletin for October and November, 1916. The work is being continued.

5. **Effect of inbreeding.**—No change.

6. **Cost of milk production.**—A brief report was given in the Monthly Bulletin for June, 1917. A more complete bulletin is nearly ready to submit.

7. **Calf rations.**—Continued.

8. **Corn silage.**—Continued.

9. **Herd improvements.**—Continued.

10. **Cooperative work on county experiment farms.**—Continued.

11. **Comparison of silos.**—Postponed.

12. **Chemical studies of milk and butterfat.**—An article regarding the presence of nitrogen in rendered and filtered butterfat is ready for publication.

13. **Studies regarding the better utilization of dairy by-products.**—A report is practically ready regarding studies made on a centrifugal method of separating cottage cheese from buttermilk.

**Publications.**—Bulletin 327, "A Comparison of Clover and Alfalfa Hay in Milk Production," C. C. Hayden. *Monthly Bulletin*: "Cost of Milk Production" (June, 1917), C. C. Hayden; "Cost of Raising Dairy Heifers" (September, 1917), C. C. Hayden; "Economy of Production by Dairy Cows" (October, 1917), R. I. Grady; "Nutrients Returned by Dairy Cows" (November, 1917), R. I. Grady; "Stage of Lactation Affects Milk Yield" (December, 1917), R. I. Grady; "Neglected Source of Valuable Human Food" (April, 1918), A. E. Perkins.

ENTOMOLOGY

Owing to the war conditions and changes in the staff several of the projects in this department are temporarily in abeyance. Following are the principal lines of work conducted under the topics previously listed:

1. **Plant lice.**—The green and pink potato and tomato aphis caused great damage during the summer of 1917 and was carefully studied and reported in Bulletin 317.

4. **Life history of the codling moth.**—Continued.

6. **Effect of long-time spraying on orchards.**—A 10-year program of orchard spraying was completed in Sandusky County in 1917 and a similar program in Gallia County will be completed this season.

9. **Insect control on city shade trees.**—A report is ready for publication.

10. **Tests of efficiency of newer insecticides.**—Work being continued.

**Wheat-insect survey.**—In cooperation with the Extension Service of the College of Agriculture, Ohio State University, an entomological survey of the State with special reference to wheat insects was made in June, covering all the more important wheat-producing counties. The results of the survey and advice regarding the best data for seeding wheat and related questions were published in the Press Bulletins and September (1918) Monthly Bulletin of the Station.

**Publications.**—Bulletin 317, "The Pink and Green Aphis of the Potato," J. S. Houser, T. L. Guyton and P. R. Lowry. *Monthly Bulletin*: "Grain-bin Sanitation" (July, 1917), W. H. Goodwin; "Insect Pests of Vegetables" (July, 1917), J. S. Houser; "The Pink and Green Potato Plant Lice" (August, 1917—Abs. Bul. 317), J. S. Houser; "Meadow and Pasture Insects" (August, 1917), Herbert Osborn; "Entomological Survey of Ohio Wheatfields" (September, 1917), H. A. Gossard; "The Green Soldier Bug" (September, 1917—Abs. Bul. 310), R. D. Whitmarsh; "Fire-Blight Infection" (November, 1917), H. A. Gossard and R. C. Walton; "War on Greenhouse Pests" (December, 1917, February, 1918, March, 1918), H. A. Gossard; "Canker-worms" (March, 1918), W. H. Goodwin; "Important Clover Insects" (April and June, 1918), H. A. Gossard; "The False Apple Red Bug" (May, 1918), H. A. Gossard; "Clover Root Borer" (June, 1918), J. R. Stear.

### FARM MANAGEMENT

On account of the difficulty of obtaining competent and regular labor no new work of consequence has been undertaken on the various district and county experiment farms.

An attempt has been made on all the farms that have been operated some length of time to make practical application of the results of the experiments; that is to organize the cropping systems to fit the dominant line of animal husbandry work undertaken, using such varieties of cereals and such fertilization as the plot work seems to indicate as best adapted to the type of soil and the system of farming followed.

Some minor changes are being made to fit the abnormal conditions caused by the war; for instance, cost figures on keeping the dairy herd on both the Trumbull and Hamilton County Experiment Farms show that unless we credit the cows with quite a sum for the manure produced they are kept at a loss under present market conditions; hence we are not trying to increase the number of cows kept but are weeding out the low producers.

The cost of producing crops on the Northeastern Test Farm for the crop year of 1917 shows wheat to be a much more profitable crop under conditions in that region than corn, consequently on the

experiment farms in northeastern Ohio we are trying to decrease the corn acreage and increase the wheat acreage insofar as is compatible with systematic crop rotation.

The area devoted to spring wheat has been increased at the Northeastern Test Farm and the Trumbull County Experiment Farm with good results.

On the Paulding County Experiment Farm a tile-drainage experiment on a small area of land was begun to test the distance apart tiles should be laid.

New residences for the foremen are being built on the Clermont and Madison County Experiment Farms.

Owing to lack of assistant help no new field investigations have been undertaken during the past year.

Because of the scarcity of reliable farm labor it may be necessary on some farms to cut down the number of experiments, retaining those that are most intimately connected with immediate food production.

**Publications.**—Bulletin 323, "County Experiment Farms in Ohio," Annual Report for 1916 and 1917, C. W. Montgomery et al. *Monthly Bulletin*: "Permanent Pastures" (January, 1918), C. W. Montgomery.

### FORESTRY

The following lines of work have been carried on by this department during the past year:

1. **Propagation of forest trees.**—(a) Fertilization. This work comprises the application of different amounts and combinations of fertilizing materials and manures on coniferous and hardwood seedbeds. (b) Control of fungi; treatment of beds of coniferous seedlings with different fungicidal materials.

2. **Reforestation.**—Methods of planting forest trees. A comparison between cleft and hole planting on different soils and experiments in direct seeding.

3. **Forest arboretums.**—This work is being conducted on state, municipal and private lands for the purpose of testing the adaptability of trees to different soils, and in different mixtures.

4. **Forest management.**—(a) Thinning experiments with catalpa are being conducted cooperatively. This work is being continued through a series of years. (b) Experiments in the improvement and reconstruction of the native woodlot are being continued. (c) Studies of the management of the beech-maple woodlot are in progress.

5. **Wood utilization.**—(a) Field data on the stands of commercial timber species by counties have been completed. Timber market studies were continued, and a report supplemental to Bulletin 302, "Marketing of Woodlot Products," is being prepared. (b) Wood-fuel studies were made and reported in the Monthly Bulletin.

6. **Commercial tree studies.**—(a) Field data on the rate of growth of the catalpa have been completed and are being computed for publication.

(b) Field data on the rate of growth and commercial aspects of the white ash are completed and office computations are practically complete for publication.

7. **Classification of lands suitable for timber growing.**—A classification of the woodlands of the Miami Conservancy District, consisting of 33,000 acres, is now in progress.

8. **Municipal forestry.**—Cooperative work is being continued on the Cincinnati and Oberlin municipal forests.

9. **The State forests.**—Operations on the Waterloo and Dean State Forests are being continued. Thirteen thousand trees were planted for experimental purposes at Waterloo during the past year. The nursery contains approximately 40,000 trees. At Dean 28 acres of old field were planted to yellow poplar. Approximately 22,000 trees were planted in a permanent plantation. The nursery at this Forest contains 100,000 seedling and transplanted trees.

**Publications.**—*Monthly Bulletin*: "Fuel and the Woodlot" (August, 1917), Edmund Secrest; "The Farmers Woodlot" (November, 1917), J. J. Crumley; "Production and Use of Fuel Wood" (February, 1918), Edmund Secrest; "Woodlot Improvement and the Production of Fuel Wood" (July, 1918), A. E. Taylor. Journal of Forestry: Vol. XVI, No. 3, "The Role of Artificial Regeneration in the Reinforcement of the Hardwood Woodlot," Edmund Secrest.

### HORTICULTURE

It is not possible under present conditions to carry on all of the projects which have been undertaken. In some cases, as with variety trials, the work may be lessened but not given up entirely, and still serve a useful purpose.

On some of the county and test farms, notably the Hamilton, Clermont, Washington and Mahoning County Experiment Farms, a considerable number of varieties of apples have been planted. The purposes in view were to furnish means for study of varieties, both for the local growers and to secure material for publication. The making of exhibitions at fairs was also considered. These orchards are coming on nicely and will soon furnish useful material for state and local fairs and for apple shows.

The results of commercial fertilizers on greenhouse crops have been published recently. Another set of experiments along this line will be started soon with some modifications.

The breeding of cabbage for disease resistance has gone along satisfactorily. Extensive tests have been carried out and there can be no doubt but a resistant strain has been secured that will be of unusual value to gardeners. Similar work with tomatoes is being continued and gives promise of usefulness.

The comparative yields from a bed of large selected 1-year-old asparagus plants vs. small weaklings, both lots grown from the same kind of seed, planted in beds at the same time and given the same care, is under investigation. A full report cannot be made until another season's cuttings have been made.

The increasing interest in grape juice and the possession of a splendid variety vineyard suggested the advisability of testing the different varieties

to determine their value for juice production. Accordingly more than 250 bottles of grape juice were made from thirty-three different varieties. In most cases two different methods were followed; one by pressing the juice from the fresh grapes and the other by heating the grapes before pressing, so that about sixty different kinds of juice were secured. Some work was done in combining the different juices and it was found that in the case of very sweet and sour kinds this combination avoided the use of cane sugar in sweetening. This is a decided advantage both from the standpoint of economy and that of ease of assimilation in the case of invalids. This work will be continued and probably concluded the coming season.

Strawberry breeding has been carried on to some extent for several years. Some 500 seedlings have been tested or will be ready for fruiting next spring. The work thus far accomplished seems to indicate that we shall soon have sufficient data to show what tendencies certain varieties will transmit to their descendants. Such information, when secured, should be of value to the plant breeder in his selection of parent varieties. For example, Wildwood, while it transmitted vigor of plant growth to its descendants, also transmitted softness and lack of size of fruit. Of sixty-three seedlings with one fall-bearing parent, eleven show fall-bearing tendencies.

The collection of currant varieties is being added to some extent, although the rigorous quarantine for white pine blister rust has hampered us in the securing of plants from abroad. We have at present over 300 lots of plants from forty nurserymen and under 100 different variety names. This comprises about all the varieties offered for sale in this country and in Europe. While the work started as a variety test it has developed into:

1. **A study in nomenclature.**—We have no careful, technical descriptions of currant varieties and these should be made from plants of known authenticity.

2. **A test of the varieties offered for sale by nurserymen.**—In the older plantation, set in 1912, one-third of the lots were misnamed or contained plants untrue to name. A later planting came in full fruiting this year and, though the work was not completed on account of the lack of accurate varietal descriptions to check back upon, it has been determined that at least 20 percent of these lots require rogueing. Another fact noted is the change of name with the location. Thus the "Red Dutch" as bought from American nurserymen, the "Red Dutch" from England and the "Hollondische Rote" of the Continent are three different currants, possibly even representing three different species.

**Publications.**—*Monthly Bulletin*: "Thinning Fruit" (July, 1917), W. J. Green; "Pruning Apple Trees: Wound Dressing Unnecessary" (September, 1917), J. B. Keil; "Improving Grand Rapids Lettuce" (September, 1917), S. N. Green; "Head Lettuce for Ohio Greenhouses" (November, 1917), S. N. Green; "Bush Beans in the Greenhouse" (January, 1918), S. N. Green; "Disease-Resistant Varieties of Tomatoes" (February, 1918), S. N. Green and J. G. Humbert; "Delayed Application of Lime-Sulphur" (March, 1918), Paul Thayer; "Climbing Roses" (March, 1918), W. E. Bontrager; "Small Fruits for Home and Market" (April, 1918), W. J. Green; "Tomatoes for the Canning Factory" (April, 1918), S. N. Green; "Fertilizing Apple Orchards" (April, 1918), F. H. Ballou; "The Useful Viburnums,or Snowballs" (April, 1918); W. E. Bontrager; "Magnolias for Northern Lawns" (May, 1918), W. E. Bontrager.

NUTRITION

The work of this department, while dealing directly with farm animals, is really concerned with those fundamental problems which have to do with human as well as animal nutrition, and because of the experience Dr. E .B. Forbes, the Chief of this Department, had had in this work he was urgently requested by the War Department to accept a commission as Major in the Food Division of the Sanitary Corps of the Army, to assist in the scientific improvement of the army rations, and in January he was given leave of absence during the continuance of the war for this purpose, and Dr. J. O. Halverson was made Acting Chief of the department during the absence of Dr. Forbes. A third bulletin on the "Mineral Metabolism of the Milch Cow" has been prepared for publication.

**Publications.**—*Monthly Bulletin*: "Mineral Metabolism of the Milch Cow" (January, 1918), E. B. Forbes.

SOILS

The Division of Soil Technology has been occupied with the following lines of work:

1. **Soil survey.**—The detail soil survey in cooperation with the Bureau of Soils, United States Department of Agriculture, is being continued. Mahoning, Lucas and Marion Counties have been completed while Wayne and Madison Counties are nearing completion.

2. **Soil biology.**—The projects outlined in the report for 1916-17 have been continued. A study of the various methods for the determination of nitrogen, in its various forms in physiological solutions and soil extracts has been completed. Work on the application of these methods to determinations in soil, is now under way, entailing a study of methods of soil extraction.

A review of the literature of nitrification is now nearing completion. The nitrate organisms have been isolated and a study of their morphology is now in course of publication. Studies on the physiology of the nitrate formers have been begun with the successful accomplishment of intensive nitrate formation in solution. In addition attention has been given to the study of Aztobacter and to the function of fixed nitrogen in the metabolism of this organism.

3. **Soil physics.**—The critical study of methods, as outlined in the Thirty-sixth annual report, has been continued.

**Publications.**—"Ammonia and Nitric Nitrogen Determination in Soil Extracts and Physiological Solutions," B. S. Davisson in Journal of Industrial and Engineering Chemistry; X 600; "The Determination of Moisture in Soil," B. S. Davisson and G. K. Sivaslian in Journal of the American Society of Agronomy, X, No. 5;"On Nitrification, Intensive Nitrite Formation in Solution," A. Bonazzi in Journal of Bacteriology, 1918 in press; "On Nitrification, III, the Isolation and Description of the Nitrite Ferment," A. Bonazzi in Botanical Gazette, Vl, 1918, in press. *Monthly Bulletin*: "Inoculation of Legumes" (May, 1918), A. Bonazzi.

DIVISION OF SOIL TREATMENT

The experiments listed in the 36th Annual Report, page xxiv, are being continued and the results attained on the county experiment farms have been published in Bulletin 323. The season of 1918 completes the twenty-fifth year of the older experiments at Wooster, and it is proposed to publish a summary of the results for the entire period during the coming winter.

**Publications.**—Bulletin 323, "County Experiment Farms in Ohio," C. W. Montgomery and others. *Monthly Bulletin*: "Fertilizing the Wheat Crop" (July, 1917, and August, 1917), C. E. Thorne; "Acid Phosphate vs. Raw Phosphate Rock" (August, November and December, 1917), C. G. Williams and C. E. Thorne; Acid Soils and Soil Acidity" (October, 1917), C. G. Schollenberger; "Redeeming an Impoverished Soil" (October, 1917), C. E. Thorne; "Commercial Fertilizers in War-Time" (January, 1918), C. E. Thorne; "Phosphorus Carriers in Commercial Fertilizers" (March, 1918), C. E. Thorne; "Soil Fertility Work on County Experiment Farms" (April, 1918), C. E. Thorne; "A study in Farm Drainage (April, 1918), C. E. Thorne; "Fertilizing Apple Orchards" (April, 1918), F. H Ballou; "Buying Commercial Fertilizers" (May, 1918), C. E. Thorne; "Why Not Fertilize in the Hill?" (June, 1918), C. E. Thorne.

## PUBLICATIONS

### The technical publications prepared during the year are:

Bulletin 316—Proportions of Supplements to Corn for Fattening Swine. By W. L. Robison, pp. 1-57, September, 1917.

Bulletin 317—The Pink and Green Aphis of Potato. By J. S. Houser, T. L. Guyton and P. R. Lowry, pp. 59-88, November, 1917.

Bulletin 318—Relation of Phosphorus and Nitrogen in Soil to Composition of Wheat. By J. W. Ames and G. E Boltz, pp. 89-118, November, 1917.

Bulletin 319—Potato Diseases. By D. C. Babcock, pp. 119-136, November, 1917.

Bulletin 320—Some External Parasites of Poultry. By D. C. Mote, pp. 137-156, December, 1917.

Bulletin 321—Tomato Diseases in Ohio. By J. G. Humbert, pp. 157-196, February, 1918.

Bulletin 322—Feeding Experiments with Laying Hens. By W. J. Buss, pp. 197-241, March, 1918.

Bulletin 323—County Experiment Farms in Ohio. By C. W. Montgomery and others, pp. 243-486, May, 1918.

Bulletin 324—Ohio Weather for 1917. By W. H. Alexander and C. A. Patton, pp. 487-576, June, 1918.

Bulletin 325—Thirty-seventh Annual Report, 1917-1918, pp. i-xxvi, June, 1918.

Monthly Bulletin—Volume II, Nos. 7-12, pp. 219-419, July to December, 1917. Volume III, Nos. 1-6, pp. 1-196, January to June, 1918.

Weekly Press Bulletins.

## PERSONNEL

The following changes in the personnel of the scientific staff of the Station have occurred during the year:

### APPOINTMENTS

Professor Herbert Osborn of the Ohio State University has been appointed Honorary Associate in Entomology at the Station. Other appointments have been J. T. Parsons, assistant in soil technology; I. P. Lewis, assistant in horticulture; T. L. Guyton and J. R. Stear, assistants in entomology; Horatio Markley and H. R. Hoyt, superintendents of fair exhibits; W. J. Smith, superintendent of experiment farm; Clarence M. Baker, editor; W. G. Chambers, Field assistant in horticulture; Miss Ruth McCoy, office assistant in forestry.

### TRANSFERS

R. R. Barker, assistant in chemistry; M. O. Bugby, county agent, and F. M. Lutts, superintendent of fair exhibits, to superintendents of experiment farms.

### RESIGNATIONS

D. G. Swanger, assistant in animal husbandry; J. G. Humbert, assistant in botany; O. P. Gossard, G. K. Sivaslian, O. I. Snapp and J. T. Parsons, assistants in soil technology; T. L. Guyton, assistant in entomology; L. E. Morgan and G. H. Burke, assistants in nutrition; H. L. Andrew, assistant in farm management; L. L. Rummell, editor; Horatio Markley, superintendent of fair exhibits; W. G. Chambers, field assistant in horticulture; J. B. Keil, orchard assistant; F. K. Mathis and D. E. Snyder, office assistants.

### GIVEN LEAVE OF ABSENCE FOR MILITARY SERVICE

E. B. Forbes, chief in nutrition; R. D. Whitmarsh and J. R. Stear, assistants in entomology; R. C. Thomas, assistant in botany.

Respectfully submitted,

CHAS. E. THORNE,

*Director.*

## REPORT OF THE BURSAR

HON. G. E. JOBE,
*President of the Board of Control.*

Sir: I respectfully submit the financial report of the Ohio Agricultural Experiment Station for the fiscal year ended June 30, 1918.

In statements A, B, C, D, E, F and G will be found a record of the receipts and expenditures from the various funds; statements A and B being statements of account with the appropriations received from the National Government and a copy of the report made to the Governor of the State, to the National Secretary of Agriculture, and to the National Secretary of the Treasury; statement C being a statement of account with the United States Produce Fund; statement D being a statement of the account with the State appropriations and the Produce Fund; statement E being a statement of account with the Rotary Funds.

The five statements A, B, C, D and E are combined in statement F, which shows the total income and expenditures for the fiscal year.

Statement G is a balance sheet which shows the condition of each fund at the close of business, June 30, 1918.

Respectfully submitted,
W. H. KRAMER,
*Bursar.*

## STATEMENT A

### HATCH FUND

**The Ohio Agricultural Experiment Station in Account with the United States Appropriation under the Hatch Act for 1917-18**

Dr.

| | |
|---|---|
| To receipts from the Treasurer of the United States, as per appropriation for the year ended June 30, 1918, as per act of Congress approved March 2, 1887 | $15,000.00 |

Cr.

| | | |
|---|---|---|
| By expenditures for: | | |
| Salaries | $1,890.24 | |
| Wages | 1,918.85 | |
| Forage and veterinary supplies | 4,218.37 | |
| Fuel supplies | 894.58 | |
| Office supplies | 86.07 | |
| Botanical and agricultural supplies | 70.30 | |
| General plant supplies | 576.90 | |
| General plant materials | 856.15 | |
| Educational and recreational equipment | 7.80 | |
| General plant equipment | 3,045.16 | |
| General repairs | 433.77 | |
| Transportation | 823.22 | |
| Communication | 119.25 | |
| General plant service | 39.34 | |
| Contributions | 20.00 | |
| Total | | $15,000.00 |

## STATEMENT B

### ADAMS FUND

**The Ohio Agricultural Experiment Station in Account with the United States Appropriation under the Adams Act for 1917-18**

Dr.

| | |
|---|---|
| To receipts from the Treasurer of the United States, as per appropriation for the fiscal year ended June 30, 1918, as per act of Congress approved March 16, 1906 | $15,000.00 |

Cr.

| | | |
|---|---|---|
| By expenditures for: | | |
| Salaries | $10,197.49 | |
| Wages | 696.74 | |
| Office supplies | 5.63 | |
| General plant supplies | 1,412.50 | |
| General plant materials | 3.98 | |
| Office equipment | 83.03 | |
| General plant equipment | 2,599.13 | |
| General plant service | 1.50 | |
| Total | | $15,000.00 |

## STATEMENT C

### ADAMS PRODUCE FUND

**The Ohio Agricultural Experiment Station in Account with the United States Produce Fund**

Dr.

To Receipts

| | | |
|---|---|---|
| From Department of Nutrition | $2,929.05 | |
| " Department of Soils | 317.84 | |
| Total | | $3,246.89 |
| To balance forward July 1, 1918 | | 1,647.86 |
| Total | | $4,894.75 |

Cr.

By expenditures

| | | |
|---|---|---|
| Wages | $ 693.54 | |
| Forage and veterinary supplies | 1,152.92 | |
| General plant supplies | 9.71 | |
| General plant equipment | 13.50 | |
| General plant service | 46.00 | |
| Total | | $1,915.67 |
| Total balance forward | | 2,979.08 |
| | | $4,894.75 |

## STATEMENT D

**The Ohio Agricultural Experiment Station in Account with the State and Produce Funds**

Dr.

To Receipts

| | | |
|---|---|---|
| From State appropriations | $300,030.00 | |
| " Department of Administration | 879.87 | |
| " Department of Agronomy | 2,750.79 | |
| " Department of Animal Husbandry | 9.06 | |
| " Department of Botany | 1,672.30 | |
| " Department of Chemistry | 2.60 | |
| " Department of Dairy | 16.37 | |
| " Department of Entomology | 23.00 | |
| " Department of Forestry | 94.67 | |
| " Department of Horticulture | 4,411.64 | |
| " Department of Nutrition | 8.65 | |
| " Department of Soils | 35.38 | |
| " Northeastern Test Farm | 1,336.77 | |
| " Northwestern Test Farm | 254.97 | |
| " Southeastern Test Farm | 2,107.59 | |
| " Southwestern Test Farm | 832.34 | |
| Total | | $314,466.00 |
| To balance brought forward July, 1917 | | 27,364.58 |
| | | $341,830.58 |

Cr.

By Expenditures

| | | |
|---|---|---|
| For | Salaries | $117,201.30 |
| " | Wages | 47,637.27 |
| " | Food supplies | 4.50 |
| " | Forage and veterinary supplies | 9,906.91 |
| " | Fuel supplies | 8,306.29 |
| " | Office supplies | 1,961.46 |
| " | Laundry, cleaning and disinfecting supplies | 152.07 |
| " | Botanical and agricultural supplies | 2,264.27 |
| " | General plant supplies | 5,922.55 |
| " | Building materials | 790.07 |
| " | General plant materials | 5,191.61 |
| " | Office equipment | 131.83 |
| " | Livestock | 100.00 |
| " | Motorless vehicles and equipment | 187.00 |
| " | Wearing apparel | 11.13 |
| " | Educational and recreational equipment | 650.41 |
| " | General plant equipment | 7,636.79 |
| " | General repairs | 1,141.35 |
| " | Light, heat and power | 149.84 |
| " | Transportation | 15,464.48 |
| " | Communication | 351.75 |
| " | Contingencies | 145.57 |
| " | General plant service | 527.74 |
| " | Greenhouse repairs | 2,458.57 |
| " | Greenhouses | 14.66 |
| " | Paving | 933.05 |
| " | Ditching machine | 1,968.00 |
| " | Rent | 2,184.44 |
| " | Insurance | 57.00 |
| | Total | $233,451.91 |
| | *State Treasury | 14,436.00 |
| | Lapsed to State Treasury | 19,250.74 |
| | Balance forward | 74,691.93 |
| | | $341,830.58 |

*Deposited in State Treasury to the credit of the General Revenue Fund.

## STATEMENT E

**The Ohio Agricultural Experiment Station in Account with the Dairy and Animal Husbandry Rotary Funds**

### DAIRY ROTARY FUND

Dr.

To Receipts

| | | | |
|---|---|---|---|
| From | State appropriation | $2,500.00 | |
| " | Sale of milk and cream | 6,631.54 | |
| " | Sale of cattle | 1,666.70 | |
| " | Miscellaneous sales | 3.30 | |
| | Total | | $10,801.54 |

Cr.

By Expenditures

| | | | |
|---|---|---|---|
| For | Wages | $4,776.82 | |
| " | Forage and veterinary supplies | 3,115.90 | |
| " | Disinfecting supplies | 20.00 | |
| " | General plant supplies | 178.34 | |
| " | General plant materials | 14.48 | |
| " | Livestock | 1,000.00 | |
| " | Wearing apparel | 25.10 | |
| " | General plant equipment | 25.04 | |
| " | Transportation | 16.10 | |
| " | General plant service | 40.24 | |
| | Total | | $ 9,212.02 |
| | Balance forward | | 1,589.52 |
| | Total | | $10,801.54 |

### ANIMAL HUSBANDRY ROTARY FUND

Dr.

To Receipts

| | | | |
|---|---|---|---|
| From | Sale of cattle | $6,491.21 | |
| " | Sale of sheep | 2,418.77 | |
| " | Sale of hogs | 8,346.67 | |
| " | Sale of horses | 966.00 | |
| " | Sale of eggs | 2,896.09 | |
| " | Sale of poultry | 584.78 | |
| " | Sale of wool | 4,991.30 | |
| " | Miscellaneous sales | 15.20 | |
| | Total | | $26,710.02 |

Cr.

By Expenditures

| | | | |
|---|---|---|---|
| For | Wages | $ 8,196.34 | |
| " | Forage and veterinary supplies | 14,936.01 | |
| " | General plant supplies | 1,417.11 | |
| " | General plant materials | 284.18 | |
| " | Livestock | 498.25 | |
| " | General plant equipment | 29.64 | |
| " | Transportation | 4.10 | |
| " | General plant service | 55.25 | |
| " | Insurance | 1.00 | |
| | Total | | $25,448.88 |
| | Balance forward | | 1,261.14 |
| | Total | | $26,710.02 |

## STATEMENT F

**Total Receipts and Expenditures of the Ohio Agricultural Experiment Station for the Year ended June 30, 1918**

Dr.

To Receipts

| | | | |
|---|---|---|---|
| From | United States appropriations | $ 30,000.00 | |
| " | State appropriations | 302,530.00 | |
| " | Produce funds | 52,694.45 | |
| | Total | | $385,224.45 |
| | To balance brought forward July 1, 1917 | | 29,012.44 |
| | | | $414,236.89 |

Cr.

By Expenditures

| | | | |
|---|---|---|---|
| For | Salaries | $129,289.03 | |
| " | Wages | 63,919.56 | |
| " | Food supplies | 4.50 | |
| " | Forage and veterinary supplies | 33,357.11 | |
| " | Fuel supplies | 9,200.87 | |
| " | Office supplies | 2,053.16 | |
| " | Laundry, cleaning and disinfecting supplies | 172.07 | |
| " | Botanical and agricultural supplies | 2,334.57 | |
| " | General plant supplies | 9,517.11 | |
| " | Building materials | 790.07 | |
| " | General plant materials | 6,350.40 | |
| " | Office equipment | 214.86 | |
| " | Livestock | 1,598.25 | |
| " | Motorless vehicles and equipment | 187.00 | |
| " | Wearing apparel | 36.23 | |
| " | Educational and recreational equipment | 658.21 | |
| " | General plant equipment | 13,349.26 | |
| " | General repairs | 1,575.12 | |
| " | Light, heat and power | 149.84 | |
| " | Transportation | 16,307.90 | |
| " | Communication | 471.00 | |
| " | Contingencies | 145.57 | |
| " | General plant service | 710.07 | |
| " | Greenhouse repairs | 2,458.57 | |
| " | Greenhouses | 14.66 | |
| " | Paving | 933.05 | |
| " | Ditching machine | 1,968.00 | |
| " | Rent | 2,184.44 | |
| " | Insurance | 58.00 | |
| " | Contributions | 20.00 | |
| | Total | | $300,028.48 |
| | *State Treasury | | 14,436.00 |
| | Lapsed to State Treasury | | 19,250.74 |
| | To balance forward | | 80,521.67 |
| | **Total** | | $414,236.89 |

*Deposited in State Treasury to the credit of the General Revenue Fund.

## STATEMENT G

### BALANCE SHEET, JUNE 30, 1918

| Date of appropriation | Appropriation titles | Balance July 1, 1917 | Appropriation | Receipts transfers | Total | Lapsed to State Treasury | Expenditures | Balance June 30, 1918 |
|---|---|---|---|---|---|---|---|---|
| 1915-16 | Wages | $ 540.99 | | | $ 540.99 | $ 540.99 | | |
| | Food supplies | 23.50 | | | 23.50 | 19.00 | 4 50 | |
| | Forage and veterinary supplies | 1.29 | | | 1.29 | 1.29 | | |
| | Fuel supplies | 76.97 | | | 76.97 | 76.37 | .60 | |
| | Office supplies | 243.15 | | | 243.15 | 154.39 | 88.76 | |
| | Laundry, cleaning and disinfecting supplies | .38 | | | .38 | .38 | | |
| | Refrigerating supplies | 31.18 | | | 31.18 | 31.18 | | |
| | Botanical and agricultural supplies | 32.14 | | | 32.14 | 31.04 | 1.10 | |
| | General plant supplies | 524.45 | | | 524.45 | .91 | 515.54 | 8.00 |
| | Building materials | 19.59 | | | 19.59 | .39 | 19.20 | |
| | General plant materials | 86.52 | | | 86.52 | .55 | 74.84 | 11.13 |
| | Office equipment | 16.15 | | | 16.15 | 14.65 | 1.50 | |
| | Live stock | 1,527.29 | | | 1,527.29 | 1,452.29 | | 75.00 |
| | Motorless vehicles and equipment | 98.50 | | | 98.50 | 18.50 | 80.00 | |
| | Wearing apparel | .92 | | | .92 | .92 | | |
| | General plant equipment | 1,014.23 | | | 1,014.23 | | 979.32 | 34.91 |
| | General repairs | 2.63 | | | 2.63 | .14 | 2.49 | |
| | Light, heat and power | 187.79 | | | 187.79 | 186.94 | .85 | |
| | Transportation | 242.39 | | | 242.39 | 200.05 | 42 34 | |
| | Communication | 1.00 | | | 1.00 | 1.00 | | |
| | Contingencies | 53.77 | | | 53.77 | 2.55 | 51.13 | .09 |
| | General plant service | 7.72 | | | 7.72 | 3.92 | 3.80 | |
| | Rent | 1,251.43 | | | 1,251.43 | 1,026.43 | 225.00 | |
| | Insurance | .50 | | | .50 | .50 | | |
| | Contributions | .75 | | | .75 | .75 | | |
| 1616-17 | Salaries | 11,682.47 | | | 11,682.47 | 11,650.42 | 32.05 | |
| | Wages | 811.84 | | | 811.84 | 706.08 | 105.76 | |
| | Forage and veterinary supplies | 37.39 | | | 37.39 | | 37.39 | |
| | Office supplies | 280.44 | | | 280.44 | 34.24 | 246.20 | |
| | Laundry, cleaning and disinfecting supplies | 2.25 | | | 2 25 | 2 25 | | |
| | Refrigerating supplies | 5.96 | | | 5.96 | 5.96 | | |
| | Agricultural supplies | 257.37 | | | 257.37 | 153.34 | 94.53 | 9.50 |
| | General plant supplies | 216.31 | | | 216.31 | .66 | 208.95 | 6.70 |
| | Building materials | 791.84 | | | 791.84 | 4.89 | 770.87 | 16.08 |

## BALANCE SHEET, JUNE 30, 1918—Continued

| Date of appropriation | Appropriation titles | Balance July 1, 1917 | Appropriation | Receipts transfers | Total | Lapsed to State Treasury | Expenditures | Balance June 30, 1 18 |
|---|---|---|---|---|---|---|---|---|
| 1916-17 | General plant materials | 202.17 | | | 202.17 | 11.27 | 190.90 | |
| | Office equipment | 2.01 | | | 2.01 | 2.01 | | |
| | Livestock | 1,001.86 | | | 1,001.86 | 901.86 | 100.00 | |
| | Motorless vehicles and equipment | 125 00 | | | 125.00 | 18.00 | 107.00 | |
| | Wearing apparel | 1.71 | | | 1.71 | 1.71 | | |
| | Educational and recreational equipment | .02 | | | .02 | .02 | | |
| | General plant equipment | 4.63 | | | 4.63 | .66 | 3.97 | |
| | General repairs | 556.81 | | | 556.81 | 41.93 | 514.88 | |
| | Light, heat and power | 141.14 | | | 141.14 | 126.54 | 14.60 | |
| | Transportation | 2,468.52 | | | 2,468.52 | 1,630.16 | 838.36 | |
| | Contingencies | 95.34 | | | 95.34 | .90 | 94.44 | |
| | General plant service | 49.74 | | | 49.74 | 15.35 | 34.39 | |
| | Additions and betterments | 2,539.59 | | | 2,539.59 | 80.17 | 2,458.57 | .85 |
| | Rent | 82.04 | | | 82.04 | 74.29 | 7.75 | |
| | Insurance | 22.90 | | | 22.90 | 22.90 | | |
| 1917-18 | Salaries | | 131,040.00 | | 131,040.00 | | 117,169.25 | 13,870.75 |
| | Wages | | 60,500.00 | | 60,500.00 | | 47,531.51 | 12,968.49 |
| | Food supplies | | 25.00 | | 25.00 | | | 25.00 |
| | Forage and veterinary supplies | | 17,000.00 | | 17,000.00 | | †{2,500.00 9,869.52 | 4,630.48 |
| | Fuel supplies | | 60,00.00 | 4,500.00 | 10,500.00 | | 8,305.69 | 2,194.31 |
| | Office supplies | | 16,50.00 | | 1,650.00 | | 1,626.50 | 23.50 |
| | Laundry, cleaning and disinfecting supplies | | 200.00 | | 200.00 | | 152.07 | 47.93 |
| | Agricultural supplies | | 2,300.00 | | 2,300.00 | | 2168.64 | 131.36 |
| | General plant supplies | | 10,000.00 | | 10,000.00 | | †{2,000.00 5,198.06 | 2,801.94 |
| | General plant materials | | 5,000.00 | | 5,000.00 | | 4,925.87 | 74.13 |
| | Office equipment | | 500.00 | | 500.00 | | 130.33 | 369.67 |
| | Livestock | | 1,500.00 | | 1,500.00 | | 1,000.00 | 500.00 |
| | Wearing apparel | | 25.00 | | 25.00 | | 11.13 | 13.87 |
| | Educational and recreational supplies | | 1,200.00 | | 1,200.00 | | 650.41 | 549.59 |
| | General plant equipment | | 6,000.00 | 1,000.00 | 7,000.00 | | 6,653.50 | 346.50 |
| | General repairs | | 500.00 | 300.00 | 800.00 | | 623.98 | 176.02 |
| | Light, heat and power | | 350.00 | | 350.00 | | 134.39 | 215.61 |

## BALANCE SHEET, JUNE 30, 1918—Concluded

| Date of appropriation | Appropriation titles | Balance July 1, 1917 | Appropriation | Receipts transfers | Total | Lapsed to State Treasury | Expenditures | Balance June 30, 1918 |
|---|---|---|---|---|---|---|---|---|
| 1917-18 | Transportation | | $17,500.00 | $500.00 | $18,000.00 | | †{ $800.00<br>{ 14,583.78 | $2,616.22 |
| | Communication | | 400.00 | | 400.00 | | 351.75 | 48.25 |
| | General plant service | | 500.00 | | 500.00 | | 489.55 | 10.45 |
| | Greenhouses | | 12,000.00 | | 12,000.00 | | 14.66 | 11,985.34 |
| | Addition to smokestack | | 800.00 | | 800.00 | | | 800.00 |
| | Printing warehouse | | 10,000.00 | | 10,000.00 | | | 10,000.00 |
| | Water wells | | 500.00 | | 500.00 | | | 500.00 |
| | Fencing | | 1,200.00 | | 1,200.00 | | | 1 200.00 |
| | Paving | | 5,000.00 | | 5,000.00 | | 933.05 | 4,066.95 |
| | Ditching machine | | 2,000.00 | | 2,000.00 | | 1,968.00 | 32.00 |
| | Reservoir | | 1,500.00 | | 1,500.00 | | | 1,500.00 |
| | Rent | | 3,240.00 | | 3,240.00 | | 1,951.69 | 1,288.31 |
| | Insurance | | 100.00 | | 100.00 | | 57.00 | 43.00 |
| | Contributions | | 1,500.00 | | 1,500.00 | | | 1,500.00 |
| | Adams Fund | | 15,000.00 | | 15,000.00 | | 15,000.00 | |
| | Hatch Fund | | 15,000.00 | | 15,000.00 | | 15,000.00 | |
| | Adams Produce Fund | 1,647.86 | | 3,246.89 | 4,894.75 | | 1,915.67 | 2,979.08 |
| | Rotary Funds | | 2,500.00 | 35,011.56 | 37,511.56 | | 34,660.90 | 2,850.66 |
| | Produce Fund | | | 14,436.00 | 14,436.00 | | *14,436.00 | |
| | Totals | $29,012.44 | $332,530.00 | $52,694.45<br>†6,300.00 | $414,236.89<br>†6,300.00 | $19,250.74 | $300,028.48<br>† 6,300.00<br>*14,436.00 | $80,521.67 |

†Transfers.
*Deposited in State Treasury to the credit of the General Revenue Fund.

APPENDIX

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of the

# Ohio Agricultural Experiment Station

for the year ended June 30, 1918

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